

Amendments to the Drawings

The attached sheets of drawings includes changes to Figures 1-12.

Attachment: replacement sheet(s) 1-20.

Remarks and Arguments

In a first office action, the Examiner rejected the claims as anticipated by or obvious over U.S. Patent 3,436,641 to Segsworth, alone or in combination with other references. In a personal interview held April 5, 2005, the differences between Applicant's claimed invention and the cited references were discussed and the rejections withdrawn. Additional searching by the Examiner had found two Japanese references to Kitazumi (JP 02117088A and 02117089A), which the Examiner subsequently had translated and provided to Applicant. After receipt and review of the translations, Applicant conducted an independent search for prior art in various European patent databases and discovered Great Britain Patent 752268 to Terry, which Applicant now presents (by an accompanying IDS) for consideration by the Examiner.

Applicant will comment on the three main references now of record.

As discussed at the interview, Segsworth uses harmonics in a control portion of a power supply circuit, and filters out the harmonics prior to delivery to the heater coil. Thus, Segsworth delivers a high frequency sinusoidal signal to match the resonance of the load. This is in accordance with the generally accepted view for powering inductive heaters, i.e., with high frequency sinusoidal resonant power supplies (as referenced in Applicant's specification at paragraph 43).

In contrast, Applicant claims a power source providing current pulses with high frequency harmonics "to a heater coil generating a magnetic flux for inductive heating of an article." Segsworth essentially teaches away from this solution.

The Kitazumi references recognize that harmonics may be generated as an undesirable side effect in prior art power supplies designed to provide a fundamental sinusoidal signal to a resonant inductive heating circuit. Kitazumi attempts to "utilize" these undesired harmonics for heating, but in a fundamentally different way, namely by creating an additional resonant heating circuit for each harmonic – which could also be characterized as creating multiple resonant circuits at different fundamental frequencies. As a result, Kitazumi actively suppresses the overall harmonic content of each resonant circuit (see page 3 of translation of JP-02117088). This also effectively teaches away from Applicant's claimed invention, in which a power supply delivers current pulses with high frequency harmonics to an inductive heating coil.

Finally, the Terry patent suggests that it would be “desirable” to provide improved efficiency of inductive heating utilizing alternating current of standard frequency, i.e., 50 cycles per second, in which the improvement in efficiency is obtained by incorporating in the alternating current of standard (mains) frequency a substantial proportion of harmonics of that frequency (Terry, column 1, lines 29-38). However, Terry fails to describe an apparatus or method for achieving the stated goal. Instead, Terry describes as its only implementation: “Current having the required characteristics can be produced by increasing the induction density in the iron core of a transformer employed to step down the mains voltage.” (Terry, column 1, lines 39-43). Reducing (stepping down) the voltage amplitude produces a power loss (in terms of delivery to the load), not a net increase in efficiency (effective energy transfer). Furthermore, Terry teaches that: “The transformer is designed with a core of lower cross-section than normal, i.e. the core is of such cross-sectional area as will distort considerably the waveform in the secondary produced from that pure normal mains frequency current in the primary for which the windings and the cooling provisions are designed.” (Terry column 1, line 43 to column 2, line 50). Thus, in an attempt to produce harmonic frequencies superimposed on a fundamental frequency, Terry teaches saturating the magnetic element (core) which results in a consumption of energy (energy lost) in the converter, whereby more energy goes into heating the primary coil of the transformer, as opposed to the load. There is thus less energy (power) delivered for inductive heating of the load, and as a result Terry fails to teach any implementation which can achieve the stated objective of improving the efficiency of induction heating.

Applicant has been unable to find any later U.S. patents which cite the Terry patent or evidence that the subject matter of the Terry patent was commercialized. For the reasons stated, Applicant believes that the Terry patent is of little or no value to the skilled person as it appears to be a “paper” patent whose disclosed implementation is internally inconsistent with the stated objective.

In contrast, Applicant claims a power source providing current pulses with high frequency harmonics to a heater coil generating a magnetic flux for inductive heating of an article, and wherein “the harmonics increase the power transferred inductively to the article.” This distinguishes Terry’s power consumption (loss) by saturation of a core and

whereby energy is consumed by heating of the primary transformer coil. Again, Terry teaches away from Applicant's claimed invention.

Reconsideration and allowance of the present claims 1-28 is respectfully requested. Claims 24-28 have been amended similarly to claim 1.

Applicant believes that no further response is required regarding the provisional double patenting rejection and other prior art references in view of the amendments made herein and asserted differences over the prior art discussed herein (which the other references have not been asserted to and fail to cure).

RECONSIDERATION

It is believed that all claims of the present application are now in condition for allowance.

Reconsideration of this application is respectfully requested. If the Examiner believes that a teleconference would expedite prosecution of the present application the Examiner is invited to call the Applicant's undersigned attorney at the Examiner's earliest convenience.

Any amendments or cancellation or submissions with respect to the claims herein is made without prejudice and is not an admission that said canceled or amended or otherwise affected subject matter is not patentable. Applicant reserves the right to pursue canceled or amended subject matter in one or more continuation divisional or continuation-in-part applications.

Please grant any extensions of time required to enter this response and charge any fees in addition to fees submitted herewith that may be required to enter/allow this response and any accompanying papers to our deposit account 02-3038 and credit any overpayments thereto.

Respectfully submitted,

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